Personal Portfolio

Vincenzo Misuraca

Mechanical Technician | Engine Maintenance, CAD, 3D Prototyping

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VINCENZO MISURACA
MECHANICAL TECHNICIAN

Introduction

I conceived and developed this project with the aim of building and analyzing a two-stroke engine based on the Minarelli AM6 model, increased to 86 cc, with the aim of maximizing performance in terms of power and torque, reaching rotation speeds of up to 16,000 rpm.

The project includes complete engine sizing, analysis of torque and power curves, and design of the intake system using an optimized reed valve.

All preliminary calculations were performed using Excel spreadsheets, while performance simulations were performed with MATLAB. Additionally, a solid model of the engine was created with SolidWorks.

This portfolio documents the entire design process, from initial specifications to performance verification tools, providing a comprehensive overview of design choices and results achieved.

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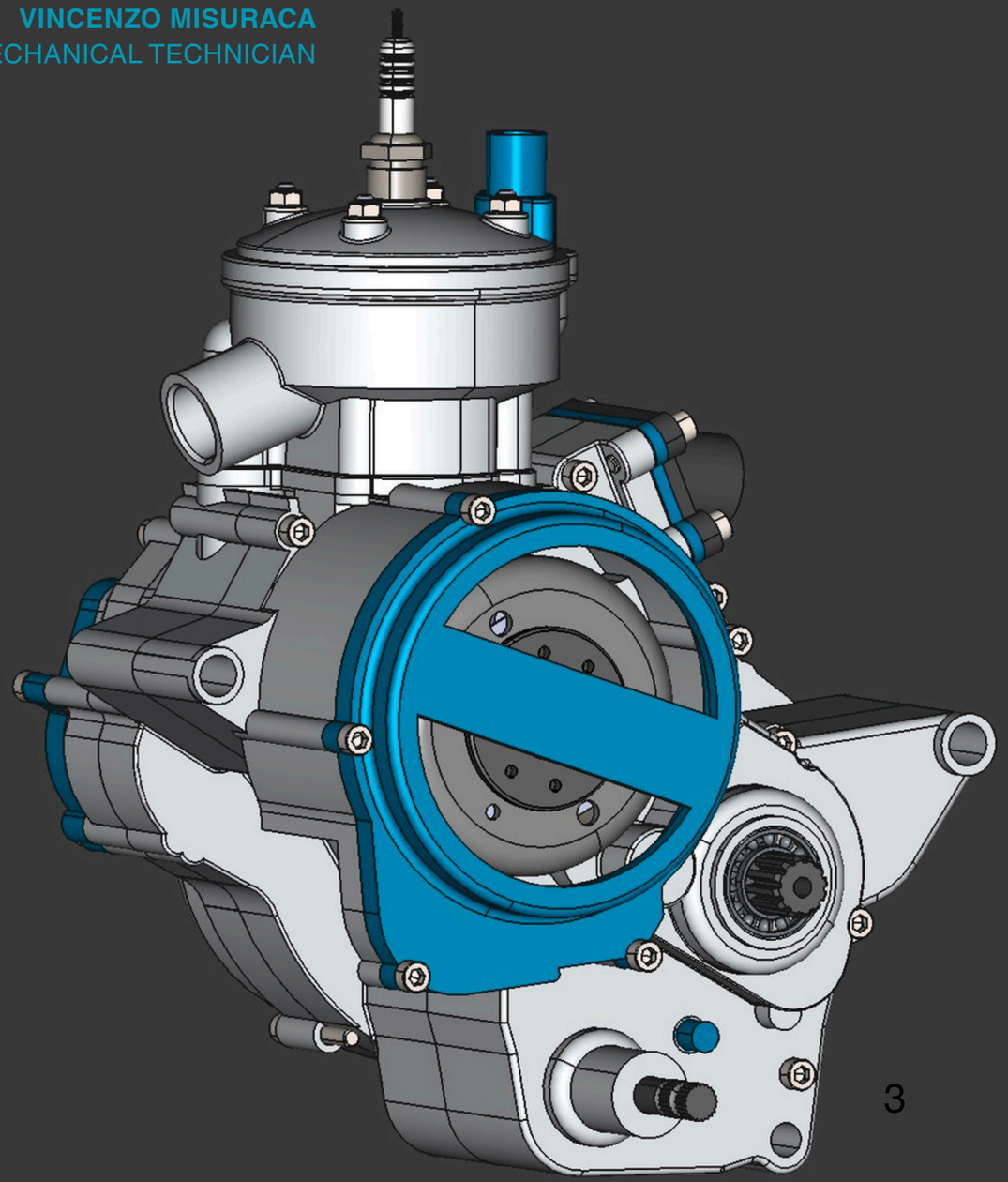

Project Specifications

INPUTS	
Target Displacement (cc)	86
Bore (mm)	50
Stroke (mm)	44
Number of transfers (excluding exhaust)	7
Target RPM (peak)	16000
Sound speed (m/s)	343
Compression Ratio (CR)	16
Piston: crown protrusion at TDC (mm)	0,9
Drain height reduction for drain valve (mm)	1,7
Conrod (mm)	100
Cd (discharge/transfer coefficient)	0,65
Air density (kg/m^3)	1,18
AFR (stoich)	14,7
Mechanical efficiency	0,85

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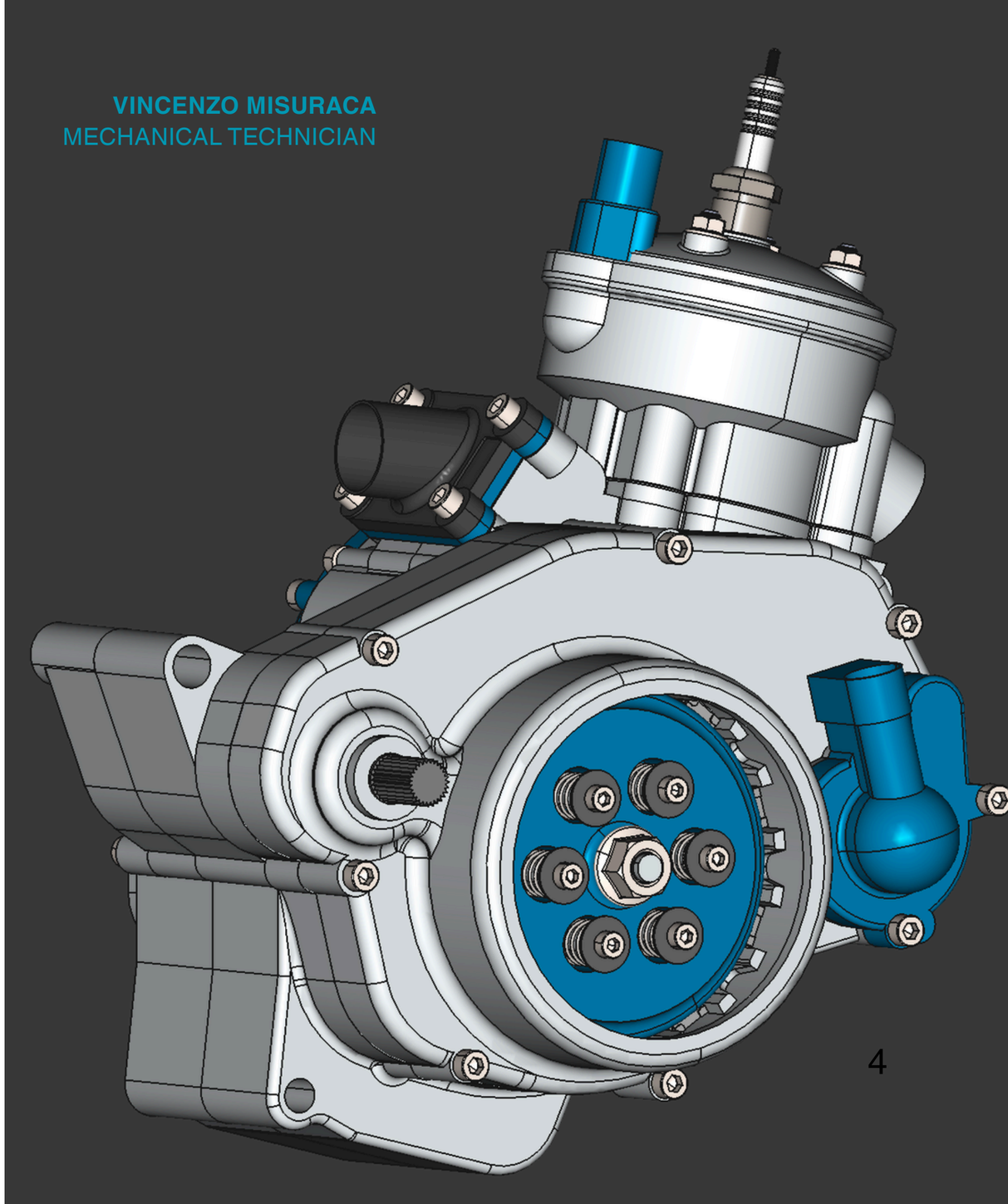

Project Specifications

GEOMETRY and VOLUMES	
Displacement formula (cc)	86,39379797
Bore (mm)	50
Stroke (mm)	44
Piston area (mm^2)	1963,49541
Volume Shifted (mm^3)	86393,798
Volume Shifted (cc)	86,393798
Average piston speed (m/s)	23,4666667

COMPRESSION and VOLUMES	
Compression Ratio (CR)	16
Light Volume (cc)	5,75958653
Combustion chamber volume (cc)	3

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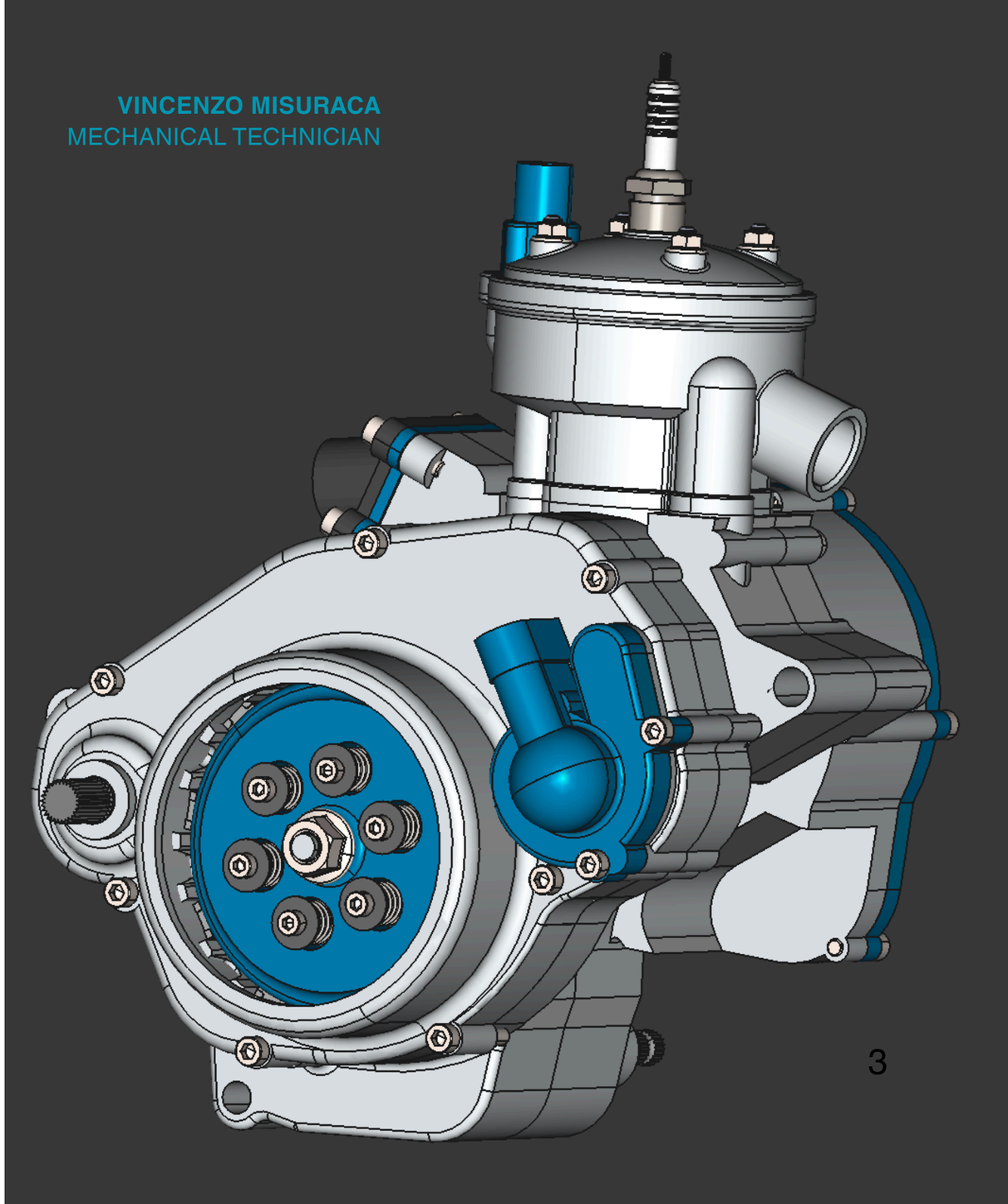
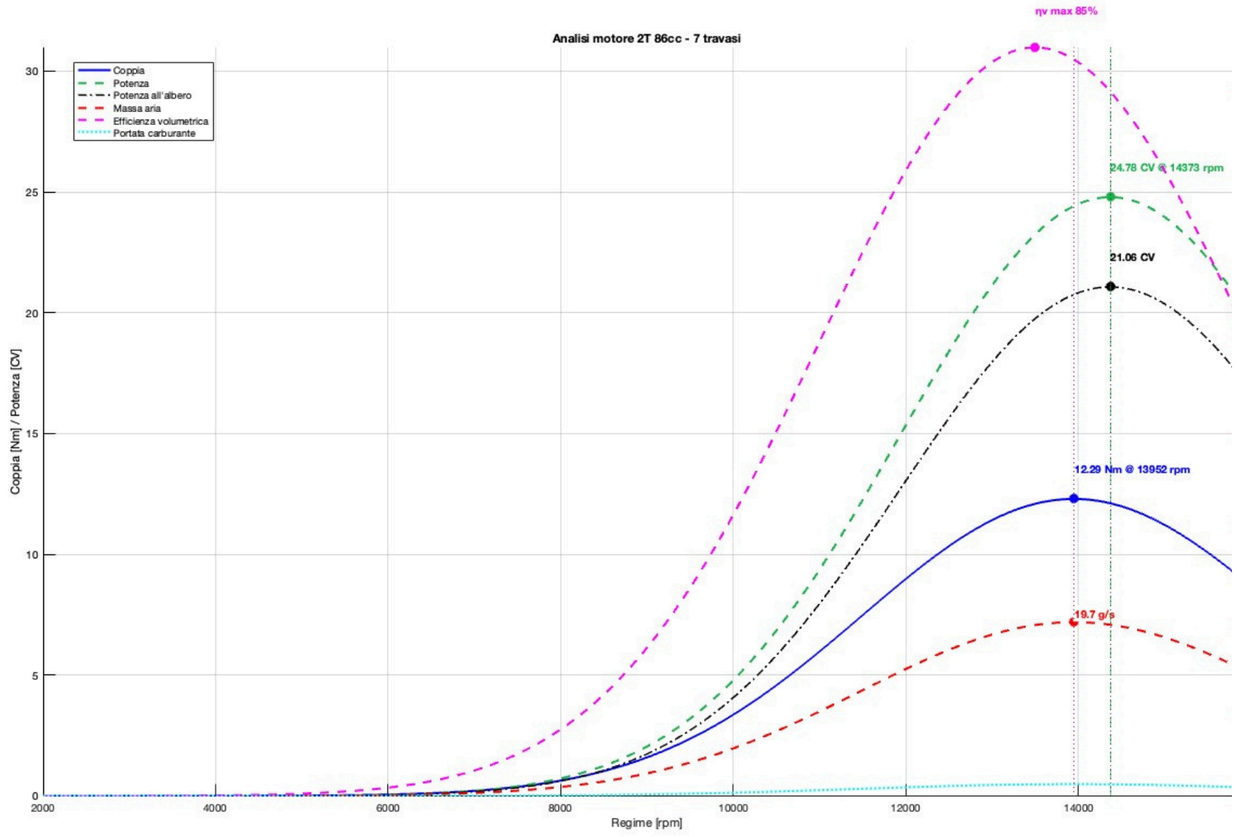


Engine Analysis



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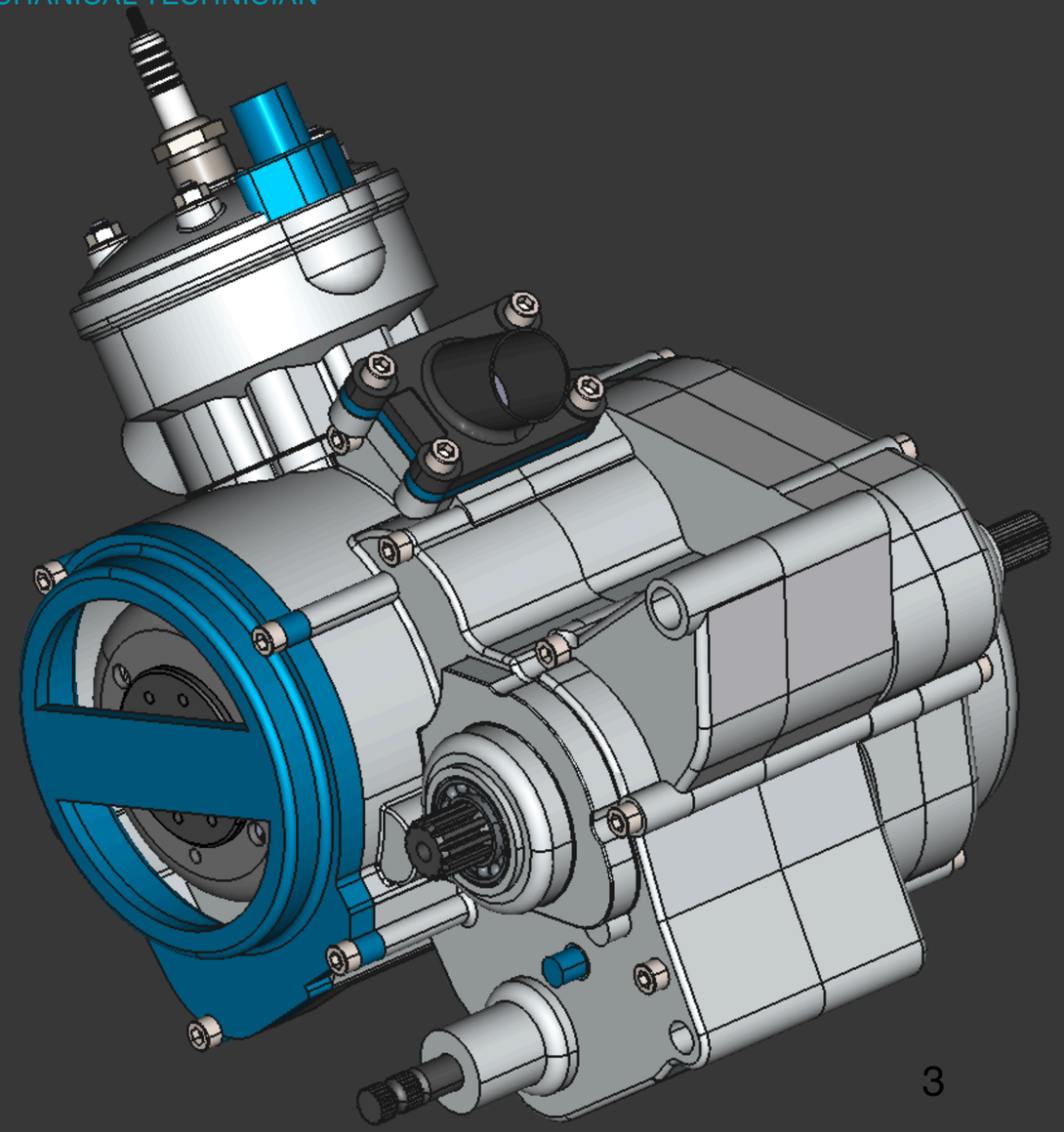

Clutch

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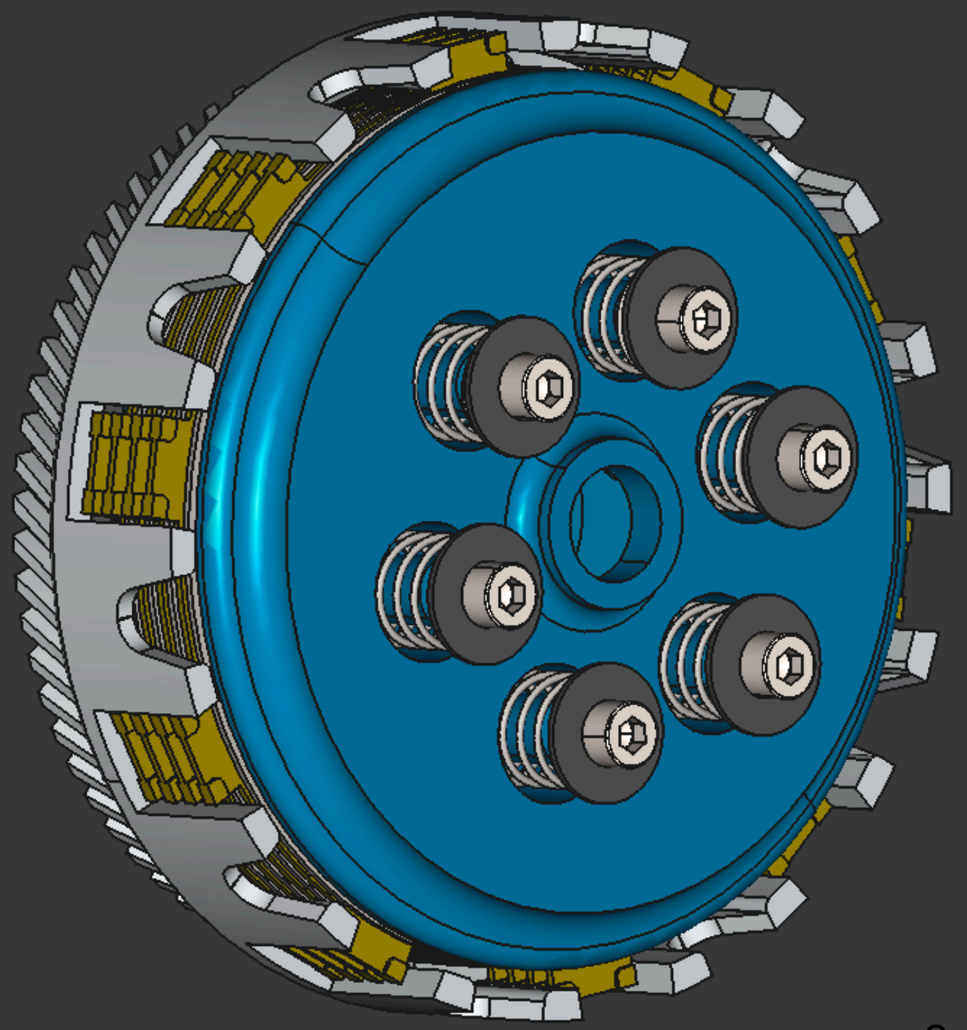
RISULTATI CALCOLATI	
Mean radius Rm [m]	0,03
Engine torque T [N·m]	14
Angular speed ω [rad/s]	680,6784083
Theoretical power P [W] (T*ω)	9529,497716
Theoretical total force F_tot [N] (without SF)	222,2222222
Total Strength with Safety Factor F_tot_design [N]	333,3333333
Spring force F_molla [N]	55,55555556
Useful stroke Δx [m]	0,006
Required elastic constant k [N/mm]	9259259,259
Stiffness k [N/m]	9259259,259



Clutch Analysis

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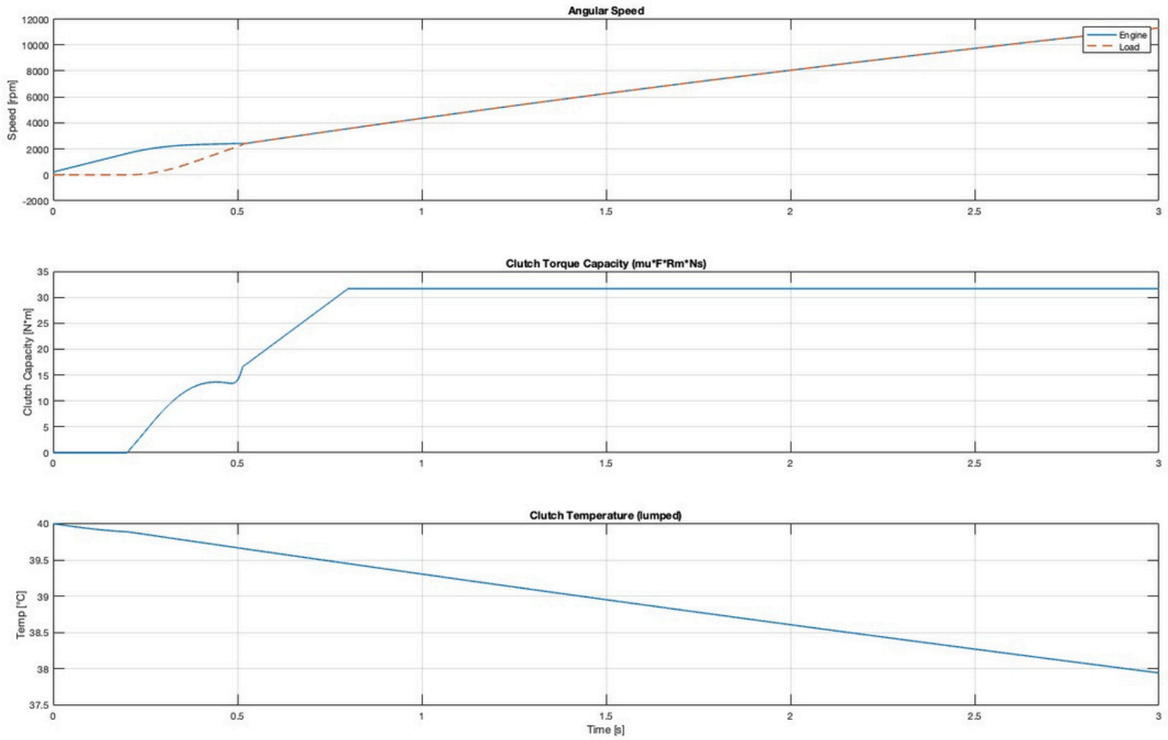

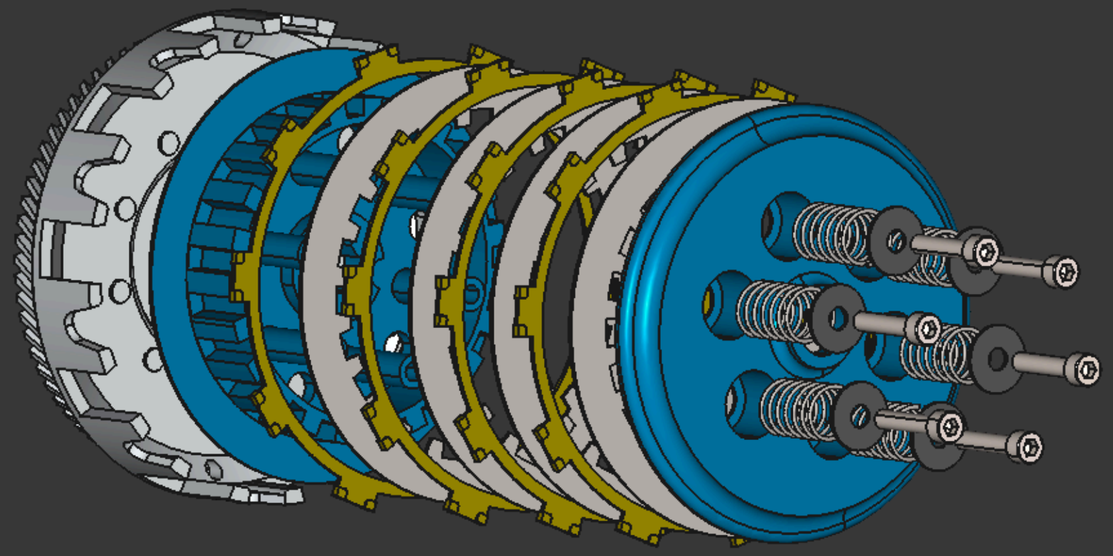

The

End

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